

CLAIMS

1. An information reproducing apparatus characterized in forming a mark of an edge in a linear shape having a predetermined angle relative to a scanning direction or the like on a medium, irradiating the mark with near-field light of linearly polarized light orthogonal to the mark and acquiring scattered light scattered by the mark as an output signal.

2. An information reproducing apparatus characterized in forming a plurality of marks of edges in a linear shape or the like on a medium by changing directions of the marks, scanning the medium while irradiating the marks with near-field light of linearly polarized light, constituting output signals by scattered light scattered by the marks and acquiring multiple value data from intensities of the output signal.

3. An information reproducing apparatus characterized in comprising:

a tracking mark of an edge in a linear shape or the like formed on a medium in a scanning direction; and

a very small aperture for tracking for scanning a vicinity of the tracking mark along the tracking mark and generating near-field light polarized in a direction orthogonal to the scanning direction by receiving light from a light source;

wherein an output signal is acquired from scattered

light scattered by the tracking mark and tracking in reproduction is executed based on an intensity of the output signal.

4. An information reproducing apparatus characterized in comprising:

a tracking mark of an edge in a linear shape or the like formed on a medium in a scanning direction;

a data mark of an edge in a linear shape or the like formed in a direction orthogonal to the scanning direction;

a very small aperture for data access for orthogonally scanning the data mark and generating near-field light polarized in the scanning direction by receiving light from a light source; and

a very small aperture for tracking for scanning a vicinity of the tracking mark along the tracking mark and generating near-field light polarized in the direction orthogonal to the scanning direction by receiving light from a light source;

wherein an output signal is acquired from scattered light scattered by the tracking mark, tracking is executed based on an intensity of the output signal, an output signal is acquired from scattered light scattered by the data mark and data is acquired based on an intensity of the output signal.

5. An information reproducing apparatus characterizing in comprising:

a very small aperture for first data access for

generating near-field light polarized in a scanning direction by receiving light from a light source;

a very small aperture for second data access for generating near-field light polarized in a direction orthogonal to the scanning direction by receiving light from a light source; and

a data mark of an edge or the like formed in the scanning direction and/or the direction orthogonal to the scanning direction based on recorded information;

wherein the near-field light polarized in the scanning direction by the very small aperture for the first data access is scattered by a data mark formed in the direction orthogonal to the scanning direction, first data is acquired based on an intensity of light scattered thereby, similarly, the near-field light polarized in the direction orthogonal to the scanning direction by the very small aperture for the second data access is scattered by a data mark formed in the scanning direction, second data is acquired based on an intensity of light scattered thereby and multiple value data is acquired from the first data and the second data.

6. An information reproducing apparatus characterized in comprising:

one very small aperture for data access for generating near-field light having linearly polarized light by receiving light from a light source;

polarized light rotating means provided between the

light source and the very small aperture for data access for rotating a direction of polarization of the near-field light; and

a data mark of an edge or the like formed in the scanning direction and/or a direction orthogonal to the scanning direction based on recorded information;

wherein the data mark is scanned by the near-field light polarized in the scanning direction or the direction orthogonal to the scanning direction, successively, the same data mark is scanned by the near-field light polarized in the direction orthogonal to the scanning direction or the scanning direction, the near-field light polarized in the scanning direction is scattered by the data mark formed in the direction orthogonal to the scanning direction, first data is acquired based on an intensity of the scattered light, similarly, the near-field light polarized in the direction orthogonal to the scanning direction is scattered by the data mark formed in the scanning direction, second data is acquired based on an intensity of the scattered light and multiple value data is acquired from the first data and the second data.

7. The information reproducing apparatus according to Claim 5 or 6, characterized in further comprising bit shift operating means for subjecting either one of the first data and the second data to bit shift and adding the either one to other thereof.

8. An information reproducing apparatus characterized

in comprising:

a data mark of an edge in a linear shape having a predetermined angle relative to a scanning direction or the like formed on a medium;

a very small aperture for generating near-field light having linearly polarized light by receiving light from a light source;

polarized light rotating means provided between the light source and the very small aperture for rotating a direction of polarization of the near-field light;

wherein the medium is scanned while irradiating the data mark with the near-field light a direction of polarization of which is rotating, scattered light scattered by the data mark constitutes an output signal and multiple value data is acquired from an intensity of the output signal and a rotational angle of the direction of polarization.

9. An information reproducing apparatus characterized in forming data marks of edges in a linear shape or the like on a medium at predetermined intervals based on recorded information, scanning the medium while irradiating the data marks with near-field light having linearly polarized light orthogonal to the data marks and acquiring data from intervals of intensities of output signals by scattered light scattered by the data marks.

10. An information reproducing apparatus characterized in providing data marks of a plurality of edges directed in

different directions or the like as one unit, the information reproducing apparatus comprising:

a very small aperture for generating near-field light having linearly polarized light by receiving light from a light source; and

polarized light rotating means provided between the light source and the very small aperture for rotating a direction of polarization of the near-field light;

wherein the one unit of the plurality of data marks is irradiated with the near-field light the direction of polarization of which is rotating, scattered light scattered by the respective data marks constitutes output signals and multiple value data is acquired from intensities of the output signals and rotational angles of the direction of polarization.

11. An information recording apparatus characterized in changing a direction of polarization of near-field light having linearly polarized light based on recorded information and irradiating a medium a surface of which is provided with a substance a state of which is changed by local heating with the near-field light to thereby record multiple value data.

12. An information recording apparatus characterized in comprising:

a very small aperture for first data recording for generating near-field light polarized in a scanning direction by receiving light from a light source;

a very small aperture for second data recording for

generating near-field light polarized in a direction orthogonal to the scanning direction by receiving light from a light source; and

a medium a surface of which is provided with a substance a state of which is changed by local heating;

wherein first data is recorded by irradiating the medium with the near-field light polarized in the scanning direction by the very small aperture for the first data recording and changing the state in the direction orthogonal to the scanning direction, similarly, second data is recorded by irradiating the medium with the near-field light polarized in the direction orthogonal to the scanning direction by the very small aperture for the second data recording and changing the state in the scanning direction to thereby record information by multiple value data.

13. An information recording apparatus characterized in comprising:

one very small aperture for data recording for generating near-field light having linearly polarized light by receiving light from a light source;

polarized light rotating means provided between the light source and the very small aperture for data recording for rotating a direction of polarization of the near-field light; and

a medium a surface of which is provided with a substance a state of which is changed by local heating;

wherein first data is recorded by irradiating the medium with the near-field light polarized in a scanning direction or a direction orthogonal to the scanning direction by the very small aperture for data recording and changing the state in the direction orthogonal to the scanning direction or the scanning direction, successively, second data is recorded by irradiating the medium with the near-field light polarized in the direction orthogonal to the scanning direction or the scanning direction and changing the state in the scanning direction or the direction orthogonal to the scanning direction to thereby record information by multiple value data.

14. An information recording apparatus characterized in comprising one very small aperture for data recording for generating near-field light having linearly polarized light by receiving light from a light source;

polarized light rotating means provided between the light source and the very small aperture for data recording for rotating a direction of polarization of the near-field light; and

a medium a surface of which is provided with a substance a state of which is changed by local heating;

wherein irradiation of the near-field light is controlled by a unit of a predetermined rotational angle based on recorded information and the state in a direction orthogonal to the direction of polarization of the near-field light is changed by the unit of the rotational angle to thereby record

information by multiple value data.

15. The information recording apparatus according to Claim 14, characterized in that the unit of the rotational angle is made to be equal to or larger than 10°.

16. An information reproducing apparatus characterized in comprising:

a first laser oscillator used for tracking;

a second laser oscillator used for data access;

a phase plate for providing phase shift between the first laser oscillator and the second laser oscillator;

a first very small aperture for generating near-field light having linearly polarized light from laser light from the first laser oscillator; and

a second very small aperture for generating near-field light having linearly polarized light in a direction orthogonal to a direction of polarization of the near-field light generated by the first very small aperture from laser light from the second laser oscillator.

17. An information reproducing apparatus characterized in comprising:

a first laser oscillator and a second laser oscillator used for data access;

a phase plate for providing phase shift between the first laser oscillator and the second laser oscillator;

a first very small aperture for generating near-field light having linearly polarized light from laser light from

the first laser oscillator; and

a second very small aperture for generating near-field light having linearly polarized light in a direction orthogonal to a direction of polarization of the near-field light generated by the first very small aperture from laser light from the second laser oscillator.

18. An information reproducing apparatus characterized in comprising a laser oscillator used for data access;

a very small aperture for generating near-field light having linearly polarized light from laser light from the laser oscillator; and

polarized light controlling means for controlling a direction of polarization of the near-field light.

19. A record medium characterized in comprising a data mark of an edge formed in one direction or the like and a data mark of an edge formed in a direction different from the direction or the like on a track.

20. A record medium characterized in forming phase change layers in a longitudinal direction a state of each of which is changed by local heating in a plurality of directions on a track.

21. An information reproducing method characterized in irradiating a mark of an edge in a linear shape having a predetermined angle relative to a scanning direction or the like with near-field light of linearly polarized light substantially orthogonal to the mark and acquiring scattered

light scattered by the mark as an output signal to thereby reproduce information.

22. An information reproducing method characterized in forming a plurality of marks of edges in a linear shape in different directions or the like on a medium, scanning the medium while irradiating the marks with near-field light of linearly polarized light, constituting scattered light scattered by the marks as output signals and acquiring multiple value data from intensities of the output signals to thereby reproduce information.

23. An information reproducing method characterized in forming a tracking mark of an edge in a linear shape or the like in a scanning direction on a medium, generating near-field light polarized in a direction orthogonal to the scanning direction, scanning a vicinity of the tracking mark along the tracking mark by the near-field light, acquiring an output signal from scattered light scattered by the tracking mark and executing tracking in reproduction based on an intensity of the output signal.

24. An information reproducing method characterized in comprising the steps of:

forming a tracking mark of an edge in a linear shape or the like in a scanning direction on a medium and forming a data mark of an edge in a linear shape or the like in a direction orthogonal to the scanning direction;

orthogonally scanning the data mark by near-field light

polarized in the scanning direction and scanning a vicinity of the tracking mark along the tracking mark by near-field light polarized in a direction orthogonal to the scanning direction; and

acquiring an output signal from scattered light scattered by the tracking mark, executing tracking based on an intensity of the output signal, acquiring an output signal from scattered light scattered by the data mark and acquiring data based on an intensity of the output signal to thereby reproduce information.

25. An information reproducing method characterized in comprising the steps of:

forming data marks of edges or the like in a scanning direction and/or a direction orthogonal to the scanning direction based on recorded information and generating near-field light polarized in the scanning direction and the direction orthogonal to the scanning direction; and

scattering the near-field light polarized in the scanning direction by the data mark formed in the direction orthogonal to the scanning direction, acquiring first data based on an intensity of light scattered thereby, similarly, scattering the near-field light polarized in the direction orthogonal to the scanning direction by the data mark formed in the scanning direction, acquiring second data based on an intensity of light scattered thereby and acquiring multiple value data from the first data and the second data to thereby

reproduce information.

26. An information reproducing method characterized in comprising the steps of:

forming a data mark of an edge or the like in a scanning direction and/or a direction orthogonal to the scanning direction based on recorded information;

scanning the data mark by near-field light polarized in the scanning direction or the direction orthogonal to the scanning direction;

successively rotating a direction of polarization of the near-field light and scanning the same data mark by the near-field light polarized in the direction orthogonal to the scanning direction or the scanning direction; and

scattering the near-field light polarized in the scanning direction by the data mark formed in the direction orthogonal to the scanning direction, acquiring first data based on an intensity of light scattered thereby, similarly, scattering the near-field light polarized in the direction orthogonal to the scanning direction by the data mark formed in the scanning direction, acquiring second data based on an intensity of light scattered thereby and acquiring multiple value data from the first and the second data to thereby reproduce information.

27. The information reproducing method according to Claim 25 or 26, characterized in that either one of the first data and the second data is subjected to bit shift and the either

one is added to other thereof.

28. An information reproducing method characterized in forming data marks of edges in a linear shape having predetermined angles relative to a scanning direction or the like on a medium, irradiating the data marks with near-field light while rotating a direction of polarization of the near-field light having linearly polarized light, constituting output signals by scattered light scattered by the data marks and acquiring multiple value data from intensities of the output signals and rotational angles at which the output signals are intensified to thereby reproduce information.

29. An information reproducing method characterized in forming data marks of edges in a linear shape or the like on a medium at predetermined intervals based on recorded information, scanning the medium while irradiating the data marks with near-field light having linearly polarized light substantially orthogonal to the data marks and acquiring data from intervals of intensities of output signals by scattered light scattered by the data marks to thereby reproduce information.

30. An information reproducing method characterized in providing data marks of a plurality of edges directed in different directions or the like as one unit, irradiating the one unit of the plurality of data marks with near-field light while rotating a direction of polarization of the near-field

light having linearly polarized light, constituting output signals by scattered light scattered by the respective data marks and acquiring multiple value data from intensities of the output signals and rotational angles at which the output signals are intensified to thereby reproduce information.

31. An information recording method characterized in changing a direction of polarization of near-field light having linearly polarized light based on recorded information and irradiating a medium a surface of which is provided with a substance a state of which is changed by local heating with the near-field light while changing the direction of polarization to thereby record multiple value data.

32. An information recording method characterized in recording first data by irradiating a medium a surface of which is provided with a substance a state of which is changed by local heating with near-field light polarized in a scanning direction and changing the state in a direction orthogonal to the scanning direction, similarly, recording second data by irradiating the medium with near-field light polarized in a direction orthogonal to the scanning direction and changing the state in the scanning direction and recording information by multiple value data.

33. An information recording method characterized in recording first data by irradiating a medium a surface of which is provided with a substance a state of which is changed by local heating with near-field light polarized in a scanning

direction or a direction orthogonal to the scanning direction and changing the state in the direction orthogonal to the scanning direction or the scanning direction, successively, rotating a direction of polarization of the near-field light, recording second data by irradiating the medium with the near-field light polarized in the direction orthogonal to the scanning direction or the scanning direction and changing the state in the scanning direction or the direction orthogonal to the scanning direction and recording information by multiple value data.

34. An information recording method characterized in irradiating a medium a surface of which is provided with a substance a state of which is changed by local heating with near-field light having linearly polarized light while rotating a direction of polarization thereof, controlling the irradiation based on recorded information by a unit of a predetermined rotational angle and changing the state in a direction orthogonal to a direction of polarization of the near-field light by the unit of the rotational angle to thereby record information by multiple value data.

35. The information recording method according to Claim 34, characterized in that the unit of the rotational angle is made to be equal to or larger than 10°.